

**Assessment Annotations  
for the Curriculum Frameworks**

# **Science**

**Grades 3, 7, and 10**



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# SCIENCE ASSESSMENT ANNOTATIONS

## FOR THE

### SCIENCE CURRICULUM FRAMEWORKS

The benchmark statements in the Science Curriculum Frameworks are at the second, fourth, eighth, and twelfth grades while the science portion of the Missouri Assessment Project will be given at the third, seventh, and tenth grades. In order to provide assistance in curriculum alignment to administrators, curriculum directors, and teachers concerning what is or is not “fair game” content for the science assessment, the attached document was developed by practicing classroom teachers and administrators.

This document includes the left-hand column (“What All Students Should Know”) and the center column (“What All Students Should Be Able To Do”) from the Science Curriculum Frameworks. The third column contains annotations about each benchmark as provided by several teacher work groups and is intended to provide guidance to **CTB/McGraw-Hill**, the assessment contractor. The first strand of the framework (Scientific Inquiry) was considered fair game at all grade levels and is not included in this document.

In the K-4 range, all of the benchmarks at grade two are “fair game” for assessment at grade 3. The benchmarks at grade four will have the words “Grade 3 state assessment” in the third column to denote a benchmark is “fair game” content or the words “Beyond grade 3 state assessment” to denote a benchmark that will not be considered at grade 3. Likewise, at the 5-8 range, the words “Grade 7 state assessment” or “Beyond grade 7 state assessment” will provide guidance. In the 9-12 range, the benchmarks will have annotations that say “Grade 10 state assessment” or “Beyond grade 10 state assessment.” Some of the annotations will be more specific and are self-explanatory. Not all benchmarks identified here as “fair game” for a state test will show up on the test in any given year.

Also, teacher work groups met in late **1996** and early 1997 to decide which of the seventy-three Show-Me Standards should be assessed on a statewide basis through the science performance assessment instrument. These teacher groups identified the following list of standards:

#### All of the Science Knowledge Standards

Performance Standards, Grade 3 :	1.3, 1.5, 1.6, 1.8, 1.10, 2.1, 3.5, 4.1
Performance Standards, Grades 7 & 10:	1.1, 1.3, 1.5, 1.6, 1.7, 1.10, 2.1, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.1

These standards will be the focus of the performance event of the science portion of the Missouri Assessment Project.

## VI. EARTH SYSTEMS----ASSESSMENT NOTES

### (Show-Me Standards, Science 5)

#### A. Physical Systems

#### B. Processes of Systems

##### K-12 Content Overview:

Knowledge of **the** processes and physical nature of the Earth provides students with a picture of the Earth's past, present, and future. The physical laws **that** have governed the entire universe in the past are the **same** as those that govern material interactions today. The Earth's physical systems, **comprised** of **subsystems** (biosphere, atmosphere, hydrosphere, and lithosphere), are continuously interacting with one another. Changes in each of the subsystems **impact** **the** earth's **physical** and biological characteristics.

The processes on the Earth, such as the **movement** of plates and the flow of air and water, are driven by heat energy from within the Earth and by **heat generated** when sunlight strikes **the atmosphere** and surface of Earth. Interactions between **heat** and other **forms** of energy with matter on the **earth shape its** surface, determine its climate, affect its atmosphere, and set the stage for life. The Earth provides humans **with the** resources **they need** to sustain life and to advance **technologically**; however, as people use these resources, they have also altered Earth systems. Questions of **environmental** policy should be **pursued** **when** students become aware of these **related issues**.

## VI Earth Systems A. Physical Systems

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
<p><i>By the end of grade 2, all students should know that</i></p> <p>1. Water reaches Earth in different forms (snow, hail, rain, fog, etc.)</p>	<p><i>By the end of grade 2, all students should be able to</i></p> <p>a. conduct research to develop and evaluate information and ideas about how water in various forms reach the Earth. (1.2; 1.6; 3.5)</p>	<p>Grade 3 state assessment Do not use the word “precipitation”</p>
<p>2. Earth’s natural resources are limited .</p>	<p>a. conduct research to develop and evaluate information on the use and abuse of the Earth’s natural resources. (1.2; 1.9)</p>	<p>Grade 3 state assessment</p>
<p>3. Earth’s surface is composed of rocks, soils, water, and living organisms. Differences in these components can be used to classify them.</p>	<p>a. Apply knowledge and skills to classify a variety of rocks or soil. (1.10;;3.5)</p>	<p>Grade 3 state assessment</p>
<p>4. The atmosphere has physical properties that are measurable and predictable.</p>	<p>a. conduct research to develop and evaluate information about the atmosphere. Plan and make a written, oral, and visual presentation of the patterns of change over a period of time. (1.2, 1.4, 1.8, 2.1)</p>	<p>Grade 3 state assessment</p>
<p><i>By the end of grade 4, all students should know that</i></p> <p>5. Fossils provide evidence of plants and animals that lived long ago and the environment in which they lived.</p>	<p><i>By the end of grade 4, all students should be able to</i></p> <p>a. plan and make a written, oral, and visual presentation about the history of our state based on evidence of fossils found in Missouri. (1.3; 1.8; 1.9; 2.1)</p>	<p>Beyond grade 3 state assessment</p>
<p>6. Water is a valuable natural resource essential to all life.</p>	<p>a. exchange information and ideas with others about water conservation and the essential need for water by all living things while recognizing different points of view. (1.4; 1.8; 2.3; 2.7)</p>	<p>Grade 3 state assessment</p>

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
7. Rocks, minerals, and soil have physical properties by which they can be classified.	a. classify rocks, minerals, and soils according to their physical characteristics (1.6; 1.8)	Grade 3 state assessment
8. Soil composition varies from location to location and determine which plants grow in that location.	a. use technological tools and other resources to locate, select and organize information from simple investigations to determine which plants grow best under various conditions in a variety of locations. (1.4; 1.6; 3.5)	Beyond grade 3 state assessment

## VI Earth Systems B. Processes of Systems

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
<i>By the end of grade 2, all students should know that</i> 1. Water is stored all over the Earth.	<i>By the end of grade 2, all students should be able to</i> a. discover and evaluate patterns and relationships in information to predict and identify areas that store water. (1.3; 1.6; 2.4; 3.5)	Grade 3 state assessment
2. Rocks change over time by weathering.	a. conduct research to develop and evaluate information to show how rocks change over time by weathering. (1.2; 1.6; 1.8; 2.4; 3.5; 4.1)	Grade 3 state assessment Do not assess the rock cycle or use the term “weathering”
3. Earth’s rotation causes a day and night cycle.	a. identify the apparent position of the sun throughout the day. (1.3; 1.6; 2.3; 3.1; 4.6)	Grade 3 state assessment
4. Seasons and changes in weather affect human and animal activity and plant growth.	a. apply the knowledge and skills learned from weather observation and investigations to study the effect on human and animal activity and plant growth. (1.3; 1.6; 1.10; 3.2; 3.3)	Grade 3 state assessment

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
5. The surface of the Earth changes slowly (e.g., erosion, weathering) or quickly (e.g., earthquakes, floods, rock/mud slides, volcanic activity).	a. present perceptions and ideas on ways the surface of the Earth changes slowly or quickly. (2.4;4.1)	Grade 3 state assessment
<i>By the end of grade 4, all students should know that</i>  6. Water condenses, evaporates, exists as a gas, liquid, or solid on Earth and in the air.	<i>By the end of grade 4, all students should be able to</i>  a. develop strategies for predicting and addressing the effect of temperature or wind on evaporation and condensation. (2.4; 3.2; 3.3)	Beyond grade 3 state assessment
7. Earth's surface features are continually changing.	a. select and apply problem-solving strategies using prior knowledge and experiences to show how and where the Earth's surface is continually changing. (1.10; 3.2; 3.3)	Beyond grade 3 state assessment

## VI Earth Systems A. Physical Systems

What All Students Should Know	What All Students Should Be Able To Do	Grade 7 Assessment Notes
<i>By the end of grade 8, all students should know that</i>	<i>By the end of grade 8, all student should be able to</i>	
1. The atmosphere is composed of a chemical mixture of gases, water vapor, and <b>minute</b> particles.	a. use technological tools and other resources to select and organize information about atmospheric properties. (1.4)	Grade 7 state assessment
2. Properties of the atmosphere are observed and measured to predict weather changes.	a. discover and evaluate patterns and relationships in the properties of the atmosphere and their structure; develop strategies to predict weather changes. (1.7)	Grade 7 state <b>assessment</b>
3. Rocks and minerals can be classified by their chemical and physical <b>propeties</b> .	a. conduct research using chemical testing and evaluate the <b>information</b> to classify a variety of rocks and minerals. (1.2; 1.6; 3.5)	Grade 7 state assessment
4. Surface and subsurface rock and mineral deposits lead to the determination of age, origin, and events in Earth's history.	a. USC appropriate technology and other resources to locate, select and organize information to detennine relative age of mineral, rock, and soil samples or associated events that may have <b>occurred</b> . (1.4; 1.6; 1.10)	Grade 7 <b>statc</b> assessment
5. Formation of layers of sedimentary rock and their associated fossils <b>confirm</b> the long history of Earth and its changing <b>lifeforms</b> .	a. construct models and geological profiles to demonstrate the age relationship of sedimentary rock layers. (1.8)	Grade 7 state assessment
6. Surface and subsurface water replenish each other. <b>Human</b> activity and natural events can affect the quality of the supply.	a. organize data, information , and ideas about human activity and natural events that affect the quality of water supplies for analysis and presentation. (1.8)	Grade 7 state assessment
7. There is economic <b>value</b> in Missouri resources, both above and below <b>ground</b> .	a. reason inductively about Missouri's mineral deposits and their relationship to the economy and deductively about envirommental concerns-past, present, and future. (3.5)	Grade 7 state assessment

What All Students Should Know	What All Students Should Be Able To Do	Grade 7 Assessment Notes
8. Earth has three physically distinct spheres: atmosphere, hydrosphere, and lithosphere. Each sphere has different composition and structure yet interfaces with each other.	a. collaborate with others in developing and clarifying perspectives by applying knowledge, measurement, and concepts of the hydrosphere, lithosphere, and atmosphere. (2.4; 4.6)	Grade 7 state assessment but only relate the surface of the Earth and its interface with the atmosphere and hydrosphere
9. The benefit of resources from the Earth's physical spheres can be reduced by deliberate or inadvertent misuse or destruction.	a. using <b>technological</b> tools, identify, analyze and evaluate causes of pollution and its effect on quality in an area. Use this information to create a model demonstrating the complexity of pollution. (1.4, 1.6, 1.8, 2.4, 3.5, 4.1)	Beyond grade 7 state assessment

## VI Earth Systems B. Processes of Systems

What All Students Should Know	What All Students Should Be Able To Do	Grade 7 Assessment Notes
<i>By the end of grade 8, all students should know that</i>	<i>By the end of grade 8, all students should be able to</i>	
1. <b>The</b> water cycle is driven by energy transfer processes, such as convection and radiation, and is constantly changing the location and phase of water.	a. exchange information, questions, and ideas with others to discuss the effects of energy transfer for processes on the cycling of water. (2.3)	Grade 7 state assessment
2. Large bodies of water have a major effect on weather and climate. Ocean currents are caused by differences in temperature and other factors.	a. organize data, information and ideas into useful <b>forms</b> for analysis and summary to predict climatic patterns associated with large bodies of water. (1.8)	Beyond grade 7 state assessment
3. <b>The</b> surface of the Earth has changed as a result of dynamic forces originating within the mantle. The physical evidence (earthquakes, volcanoes, <b>mountains</b> , etc.) of these constructive and destructive forces is associated with plate movement.	a. conduct research to develop and evaluate information and ideas concerning the theory of plate tectonics Use land form models and maps to analyze the distribution of global features and geological phenomena such as volcanoes and earthquakes. (1.2; 1.8)	Grade 7 state assessment



What All Students Should Know	What All Students Should Be Able To Do	Grade 7 Assessment Notes
4. Properties of soil and the hydrology of surface and groundwater should be understood from physical and cultural impact standpoint.	<p>a. conduct research to develop and evaluate information and ideas of the human impact on water resources. (1.2)</p> <p>b. design and conduct field or laboratory investigations to study types of soil. Recognize how the different types of soil lead to differences in drainage, percolation for septic systems, and groundwater quality. (1.3; 1.6; 3.1)</p>	Beyond grade 7 state assessment
5. Incoming solar radiation, the tilt of the Earth's axis, and the hydrologic cycle create patterns of weather and climate.	a. design and conduct field and laboratory investigations to study the effects of solar radiation, tilt of the Earth's axis, and the water cycle on patterns of weather and the climate on Earth. (1.3)	Grade 7 state assessment

## VI Earth Systems A. Physical Systems

What All Students Should Know	What All Students Should Be Able To Do	Grade 10 Assessment Notes
<p><i>By the end of grade 12, all students should know that</i></p> <p>1. Variations in the physical conditions and chemical composition of soil are a result of the geographical origin of the rock from which it came, climate, the process by which it was deposited, and biological activities.</p>	<p><i>By the end of grade 12, all students should be able to</i></p> <p>a. discover and evaluate the <b>patterns</b> and relationships of the soil to the origin of the local rock type, climate, processes of deposition, and biological activity. <b>(1.6)</b></p>	Grade 10 state assessment
<p>2. Changes <b>in</b> the atmosphere can be caused by <b>natural</b> or human activities.</p>	<p>a. identify <b>and</b> describe the scope of human activity on the atmosphere. <b>(3.1)</b></p>	Grade 10 state assessment
<p>3. Variations in composition of the atmosphere and hydrosphere by natural activities affect all life on <b>Earth</b>.</p>	<p>a. investigate information on several natural disasters and predict possible reactions of <b>plant</b>, animal, and human behavior. <b>(1.3; 1.6; 1.8; 2.3; 3.5)</b></p> <p>b. Use appropriate technology <b>and</b> other resources to locate, select, and organize information about natural disasters and their effect.; develop strategies to predict <b>occurrences</b> and/or reduce or solve the resulting problems. <b>(1.4; 3.2)</b></p>	Grade 10 state assessment

## VI Earth Systems B. Processes of Systems

What All Students Should Know	What All Students Should Be Able To Do	Grade 10 Assessment Notes
<p><i>By the end of grade 12, all students should know that</i></p> <p>1. Elements cycle through the atmosphere, hydrosphere, lithosphere, and biosphere. <b>The</b> movement of matter through the spheres is driven by <b>the</b> Earth's internal and external sources of energy.</p>	<p><i>By the end of grade 12, all students should be able to</i></p> <p>a. conduct research to develop and evaluate information on the movement of matter through a model ecosystem. (1.2)</p>	Grade 10 state assessment
<p>2. <b>Crustal</b> plate movement provides evidence of the geologic time scale.</p>	<p>a. using a variety of models and other resources, design and conduct <b>field</b> and laboratory investigations to study the Earth's energy sources. Apply the processes and knowledge <b>learned</b> to understanding changes in Earth's surface. (1.3; 1.6; 3.2; 3.3; 4.1)</p> <p>b. use technological tools and other resources to locate, select, and organize information related to a plate movement. Conduct research using a simulation of that event and evaluate the information. (1.2; 1.4)</p> <p>identify the theories associated with major geological events and present the information in the form of a time line. (3.1)</p>	Grade 10 state assessment
<p>3. Circulation of air and water around Earth, driven by radiation energy from the sun, causes weather phenomena and regional climate.</p>	<p>a. discover and evaluate the <b>patterns</b> and relationships in the circulation of air and water around the Earth, how they are driven by radiation energy from the <b>sun</b>, and how this causes weather phenomena and regional climates. (1.6)</p>	Grade 10 state assessment
<p>4. <b>Science</b> technology has enhanced our ability to detect atmospheric changes resulting from interactions of Earth's systems.</p>	<p>a. use technological tools and other resources to locate and select <b>patterns</b> of global and local weather and climate changes resulting from interactions of the Earth's systems have increased as a result of advances in science and technology. (1.4)</p>	Grade 10 state assessment